disease. Mr. MacDonald's own views are expressed with caution, and in many cases he confines himself to expounding the ideas of the author he is dealing with, without offering any opinion of his own. The question of alcoholism in its relation to crime is treated at considerable length, and the views of many different writers presented; but, as is usually the case in discussions of that subject, the variety of opinions prevailing and the lack of sufficient information about the actual physical effects of alcohol result in leaving the question unsettled.

Mr. MacDonald's book contains much that will be useful both to those who are beginning the study of criminology and to the original investigator. To the former it will suggest the most important topics for investigation and the proper methods of work, while to the latter it will serve as a guide to the literature of the subject in all its departments. In this last-named respect the book is especially strong, since it gives not only a great many digests of recent works, but also an extended bibliography of the whole subject, filling more than two hundred pages. On the whole, though we do not agree with all the author's views, we have found his book on many points both interesting and suggestive.

LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as a proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Animal Vocabularies.

Certainly one who believes in evolution cannot deny the existence of a language, of some sort, which enables the lower animals to communicate in a more or less intelligent degree.

Even my five-year-old little girl feels assured of the fact that animals can talk, "but not in our words." Only yesterday I sent her to the barn with an armful of fresh corn husks for our pony. She came running back with beaming countenance, exclaiming: "Daisy was so glad, she wanted to kiss me."

Several years ago I took great interest in some fine Brahma chickens we had raised from fluffy little chicks. There was one fine old grandmother hen which we bought to start with. She came recommended as a "good mother." And a good mother she proved to be, but she had her way of training a family. She went at it in earnest. She clucked and scratched and pointed out the best things to eat. She was fully impressed with the fact that she had a duty to perform, and she had the courage to devote herself entirely to this duty. But she always insisted upon early independence. She did not approve of chicks clinging to her and depending upon her when they were able to "scratch" for themselves, and hence she made it a rule to "wean" them early. She always gave them a parting lecture. She looked very wise and solemn, and "ca-cawed" in a peculiar tone, while the chicks stood about her in a sort of dazed, sorrowful way, wondering, no doubt, what would become of them. One "talk" ended the matter. She went off to roost alone, and the deserted chicks huddled together, "vaguely thinking" what a cold world.

Another interesting characteristic about this old grandmother hen was her solicitude for young hens who were just beginning to experience the first inclinations to sit. She would stand before their nests, and "talk" in the most earnest, subdued tones; her vocabulary must have been quite extensive, for she could continue without any hesitation for such a long time. It always seemed to me that she was relating her own experience and giving advice to the young and inexperienced of her kind. Certainly the young hens appeared to listen with all the respect possible—they no doubt "thought" that she magnified the cares and responsibilities; at least she never dissuaded a young hen from her resolution to *sit*. I agree with the writer in the last issue of *Science* (No. 549), who says "there is no need of going beyond the barn yard to hear a definite animal vocabulary of a considerable number of words."

If our language is the result of evolution, it has come up through lower forms, and it is only legitimate to credit animals with a varying degree of power of communicability.

Mrs. W. A. Kellerman.

The Circulation in Fresh-Water Mussels.

In order to demonstrate the course of the circulation in a fresh-water mussel the student is commonly directed to make six injections: from the ventricle forward into the systemic arteries; backward through the auricles into the efferent branchial vessels; from the vena cava forward into the organ of Bojanus, and backward into the system; and into one of the branchial sinuses forward into the gills and backward into the organ of Bojanus.

I have, however, sometimes succeeded in demonstrating several of these connections by a single injection as follows: Cut away a small portion only of the outer lamina of the outer gill, make a little opening into the branchial sinus and with a very slow, steady pressure inject into it. The course of the injection may then be easily watched as it proceeds down the inner lamina of the gill, and after a little time begins to ascend in the outer lamina. Presently it will begin to escape at the cut ends of the efferent branchial vessels; enough of these are, however, left intact, so that most of the fluid passes on up to the auricle, thence into the ventricle, and it may be followed as it sets out from the heart towards the front and rear of the body on its systemic journey. At the same time, of course, the injection will flow from the starting point back into the efferent vessels of the organ of Bojanus.

I have not succeeded in continuing the pressure long enough or steadily enough to make the fluid pass on into the vena cava; the small systematic vessels seem to offer so much resistance that the injection is pretty sure to make a break somewhere before it finally succeeds in making its way through them; and in the same way the renal vessels fail to transmit it backwards into the vena cava. It is very likely that a steadier hand than mine might succeed better, or that an injection controlled by the force of gravity might be made to demonstrate the complete and orderly circuit of the blood around to the starting point; but even the injection of two-thirds of the entire circuit and the gradual progress of the fluid from point to point is instructive.

Goodwin D. Swezey.
Doane College, Crete, Nebr.

Protective Mimicry of a Moth.

A correspondent of "*Science*," August 4, notes a case of protective mimicry of a moth. From the brief description given, the insect may be the Red Humped Apple-tree Caterpillar Moth, *Oedemasia concinna* which has just been reared from larvæ, at the University of Kansas, where work is being done in an economic and biologic collection of insects. About a dozen caterpillars were received from Delphos, Kansas, July 19, and after preserving two or three in alcohol, the remainder were put in breeding cages with apple leaves for food. By July 13, all had pupated, some going into ground at surface, while the majority made thin cocoons among the twigs and leaves in such manner as to be completely enveloped and hidden. Adults emerged by August 14, and then it was noticed how easily

they could be mistaken, while clinging to the limbs of trees, for short stubs of broken branches, and thus cheat their enemies out of a meal.

Taking this as the same species as described and figured in the article,it may be noticed that the distribution is wide, Ohio to Kansas, though it may be expected wherever apples are grown. From the adults, several lots of eggs were found on underside of leaves, and their development will be watched. E. S. TUCKER.

Lawrence, Kansas, Aug. 16.

EXPLOSIVE GAS IN LOCOMOTIVE ENGINES.

IN the article on p. 79 of *Science*, Aug. 11, 1893, concerning "Explosive Gas in Hot Water Apparatus," are some very pertinent questions to which I would like to add several in regard to high-pressure engines.

Assuming the facts stated as true, as they probably are, in the case of heating furnaces in houses, may they not be true also in, for instance, a locomotive engine under certain circumstances?

May not the hydrogen in a locomotive become mixed with common air?

May not this mixture be exploded under certain circumstances likely to occur in locomotives?

May not this be the real explanation of those sudden and terrific explosions that occasionally occur, where no apparent cause can be assigned? M. W. V.

Ft. Edward, N. Y., Aug. 16

COYOTE OR BEAR?

COYOTE or bear? "that is the question" which has apparently agitated Dr. Franz Heger, Curator of the Ethnographical Museum atVienna, ever since Mrs. Zelia Nuttall, Special Assistant in Mexican Archæology of the Peabody Museum, Cambridge,Mass., described and figured an ancient Mexican shield inlaid with feather-work and gold and bearing an animal device of a blue "monster" on a red field. (Internationales Archiv für Ethnographie, Vol. V., Part 1, 1892).[1]

This shield Mrs. Zelia Nuttall found preserved at Castle Ambras, in Tyrol, and, recognizing its unique character, obtained permission from the Imperial Oberhofmeisteramt at Vienna to have it sketched and photographed. It proved to be an ancient Mexican feather-work shield, with an authentic history, like the head-dress of the time of Montezuma, still exhibited at Vienna, "unfortunately always upside down." This was restored by Dr. Ferdinand von Hochstetter and described by him as a standard or banner.[2] Both head-dress[2] and shield were sent by Cortez to Charles V., and subsequently formed part of the historical collection of armor formed by his nephew, the Archduke Ferdinand of Tyrol, and were duly recorded in the Inventories of that famous collection. Strangely enough, the shield was supposed to be lost, and Professor Hochstetter lamented "its total disappearance." All the while it was lying *perdu*, in a case labelled "Transatlantic and Oriental Curiosities," at Castle Ambras in Tyrol, until its importance was recognized by Mrs. Nuttall on a chance visit to the Museum Ambras. Soon after Mrs. Nuttall announced the continued preservation and whereabouts of this valuable Ancient Mexican relic to the Anthropological Society of Berlin, and the shield was consequently removed to Vienna. Some other Ancient Mexican objects were also transferred there at the same time, and these Dr. Franz Heger has described in a memoir published in the Annals of the Imperial Natural History Museum of Vienna, 1892.[3]

It is not altogether surprising that the Austrian curators should have felt a little sore that the real history of so valuable a relic should have been forgotten, although the specimen was duly taken care of, and that its whereabouts and unique value should have been made known by a foreign visitor and Mexicaniste scholar. But that is no reason why Mrs. Zelia Nuttall's critical and searching investigations on "ancient Mexican shields" in general, and the Ambras shield in particular, should be misrepresented and misquoted. Any one reading Mrs. Nuttall's original memoir, and Dr. Heger's more recent article, cannot help seeing such to be the case. For instance, Dr. Heger curtly states, "According to Z. Nuttall the mon-

1. See "Ancient Mexican Heraldry," by Agnes Crane. Science, Vol. XX., No. 503, Sept., 1892.
2. "Standard or Head-dress," by Zelia Nuttall, Peabody Museum Papers. Vol. I., No. 1, 1888.
3. Altmexikanische Reliquien aus dem Schlosse Ambras in Tirol.